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HERPETOLOGICA

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Organ of the HERPETOLOGISTS LEAGUE, A.A.A.S. Associate

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Inauguration of the *Herpetologists League*

Herpetologists had long felt the need of a medium for their exclusive expression. Herpetologica was founded in 1936 to meet this need. The response was immediate and gratifying. We have now reached a position where it seems proper that we organize our own society. Therefore with the advice and enthusiastic consent of the subscribers, the Herpetologists League has been formed for the purpose of furthering the interests of herpetology. The League has been well and enthusiastically received. The Constitution and By-Laws, as accepted by a quorum of the members, follows:

CONSTITUTION

of the Herpetologists League

ARTICLE 1—*Object*

The object of the Herpetologists League is to further interest in herpetology.

ARTICLE 2—*Membership*

Membership in the Herpetologists League is optional with any subscriber to Herpetologica.

ARTICLE 3—*Officers*

The Officers of the Herpetologists League shall consist of a President, a Vice President, a Secretary-Treasurer and an Editor. The Officers shall be elected by ballot from a list of nominees, selected by a nominating committee appointed by the President. The Officers shall serve for two consecutive calendar years. The first biennium ending Dec. 31, 1947.

ARTICLE 4—*Meetings*

The Herpetologists League shall meet at the call of the President.

ARTICLE 5—*Funds*

All funds received by the Secretary-Treasurer shall be used for the publication of Herpetologica and for expenses incurred at meetings called by the President. The President, or persons appointed by him, shall audit the books of the Secretary-Treasurer at the close of the calendar year.

ARTICLE 6—*Alteration of the Constitution*

The Constitution may be amended at a general session by a two-thirds majority vote of the members present, or by a two-thirds majority vote of members answering communications on the subject. Provided that not less than a quorum of 35 members be present at a general session, or that not less than 51% of the members answer communications on the subject.

BY-LAWS AND RULES OF PROCEDURE of the Herpetologists League

ARTICLE 1

Any interested person, scientific society or institution may become a member. A paid-up subscription to Herpetologica includes Membership dues.

ARTICLE 2

The Officers shall arrange programs of general herpetological interest to be carried out at meetings.

ARTICLE 3

All individual members are entitled to vote. The Head of a member institution, or a person designated by him, may vote.

ARTICLE 4

The Officers may elect any member who has contributed significantly to herpetology, to be a Fellow for as long as he retains membership.

ARTICLE 5

These By-Laws may be amended by a two-thirds majority vote of members present at a general session or by a two-thirds majority vote of members answering communications upon the subject. Provided that not less than a quorum of 35 members be present at a general session, or that not less than 51% of the members answer communications on the subject.

An Unusual Predator Upon *Ambystoma Jeffersonianum*

By ALBERT G. SMITH

During the course of some field work at Eber White Woods, near Ann Arbor, Washtenaw County, Michigan, in July, 1946, an unusual opportunity to observe a defense mechanism in *Ambystoma jeffersonianum* presented itself. I had turned over a rather large rock and noted two *Ambystoma jeffersonianum* and several rather large ground beetles. The beetles scurried away to hiding places in the loose dirt of earthworm burrows. The *Ambystoma,* however, made no effort at escape. Each had the body turned in such a way that the head was beneath the body.

Upon picking them up, it was noted that they had recently been attacked. One had about one-third of the left side of its head eaten away, but still showed some movement. The other was more active and had only a small portion of its head chewed away. I replaced both specimens and then lowered the rock almost to the ground. After about five minutes, the stone was quickly lifted, to disclose two Carabid ground beetles, *Scarites subterraneus,* eating at the head of the most severely damaged *Ambystoma.* Another *Scarites* was attacking the second salamander. This salamander made no attempt to run, but had assumed the position with the head under the body. It turned slowly away from the attack. Shortly after the stone had been relifted, the beetles once again scurried to safety. Even after the attack had stopped, the *Ambystoma* made no effort to escape; instead it continued turning the slow circles.

It seems evident that one of the defense postures, then, is to assume a position with the head between the body and the ground, and, in this case, to turn away from the immediate site of the attack. Most of the attack witnessed was centered about the head of the salamander.

Miss Ada L. Olson, of the Museum of Zoology, kindly made the positive identification of the beetles. She suggested that although *Scarites* is known to capture and kill its insect food, that the salamanders may have been injured a short time previous to the attack, thus drawing the beetles to attack them.

Recent Herpetological Literature

Compiled by ALBERT G. SMITH

Bailey, Joseph R.
Leptotyphlops anthracinus, a new blind snake from Ecuador.

Occ. Papers, Mus. Zool., Univ. Mich., no. 492: 1-5, 2 tab. April 16, 1946.

Barbour, Roger W.
Additional record of the narrow-mouthed toad in Kentucky. Copeia, *1946*, no. 1: 44. April 30.

Barbour, Roger W., and L. Y. Lancaster.
Food habits of *Desmognathus fuscus* in Kentucky. Copeia, *1946*, no. 1: 48-49. April 30.

Beebe, William.
Field notes on the snakes of Kartabo, British Guiana, and Caripito, Venezuela. Zoologica, *31*, pt. 1, no. 4: 11-52, 13 pls. April 29, 1946.

Cagle, Fred R.
A lizard population in Tinian. Copeia, *1946*, no. 1: 4-9, 1 pl., 4 fig. April 30.

Cagle, Fred R.
Tail loss and regeneration in a Pacific Island Gecko. Copeia, *1946*, no. 1: 45. April 30.

Colbert, Edwin H.
The Eustachian tubes in Crocodilia. Copeia, *1946*, no. 1: 12-14, 1 pl. April 30.

Conant, Roger.
Intergradation among ring-necked snakes from southern New Jersey, and the Del-Mar-Va Peninsula. Bull., Chicago Acad. Sci., 7, no. 10: 473-482, 2 tab., 1 map. May 15, 1946.

Dunn, Emmett R.
1. A small herpetological collection from eastern Peru. Proc. Biol. Soc. Washington, *59*: 17-20. March 11, 1946.
2. *Atractus sanctaemartae*, a new species of snake from the Sierra Nevada de Santa Maria, Colombia. Occ. Papers, Mus. Zool., Univ. Mich., no. 493: 1-6. April 16, 1946.

Grant, Chapman.
1. Identification of Lepidochelys kempii (Garman). Herpetologica, *3*, pt. 2: 39. Febr. 23, 1946.
2. Alsophis angulifer adspersus (Gundlach and Peters). Herpetologica, *3*, pt. 2: 40. Febr. 23, 1946.
3. Notes on Amphisbaena. Herpetologica, *3*, pt. 2: 60-61. Febr. 23, 1946.
4. Data and field notes on the desert tortoise. Trans. San Diego Soc. Nat. Hist., *10*, no. 18: 399-402, 1 fig. March 29, 1946.

Hamilton, W. J., Jr.
Summer habitat of the yellow-barred tiger salamander. Copeia, *1946*, no. 1: 51. April 30.

Hecht, Max K., and Bessie L. Matalas.
A review of middle North American toads of the genus *Microhyla*. Amer. Mus. Novitates, no. 1315: 1-21, 12 figs. April 1, 1946.

Hilton, William A.
Salamanders from northern California. Copeia, *1946*, no. 1: 45. April 30.

Johnson, Murray L.
Herpetological notes from the West Indies. Copeia, *1946*, no. 1: 50-51. April 30.

Klauber, Laurence M.
The glossy snake, Arizona, with descriptions of new subspecies. Trans. San Diego Soc. Nat. Hist., *10*, no. 17: 311-398, 2 pls., 1 fig., 1 map. March 29, 1946.

Langebarthel, Dave.
A giant tiger salamander. Copeia, *1946*, no. 1: 51. April 30.

Miller, Robert R.
The probable origin of the soft-shelled turtle in the Colorado River Basin. Copeia, *1946*, no. 1: 46. April 30.

Mittleman, M. B.
Nomenclatural notes on two southeastern frogs. Herpetologica, *3*, pt. 2: 57-60. Febr. 23, 1946.

Mook, Charles C.
A new Pliocene alligator from Nebraska. Amer. Mus. Novitates, no. 1311: 1-12, 7 figs. March 11, 1946.

Neill, Wilfred T.
Notes on *Crocodylus novae-guineae*. Copeia, *1946*, no. 1: 17-20. April 30.

Orton, Grace L., and Fred D. Morrison.
Some amphibians and reptiles from the Gold Coast. Copeia, *1946*, no. 1: 15-17. April 30.

Palmer, R. S.
The rattlesnake in Maine. Nat. Hist. Misc., no. 2: 1-3. April 24, 1946.

Peters, James A.
Reptiles and amphibians of Sam A. Baker State Park, Wayne County, Missouri. Copeia, *1946*, no. 1: 44. April 30.

Raven, H. C.
Predators eating turtle eggs in the East Indies. Copeia, *1946*, no. 1: 48. April 30.

Ruibal, Rudolph.
A new *Sphaerodactylus* from the Dominican Republic. Amer. Mus. Novitates, no. 1308: 1-4, 5 figs. Jan. 24, 1946.

Smith, Hobart M.
1. Handbook of Lizards. Lizards of the United States and Canada,

xxi 557, 135 pls., 41 maps. Ithaca, N.Y.: Comstock Publishing Co., Inc. 1946.

2. Preliminary notes and speculations on the *Triseriatus* group of rattlesnakes in Mexico. Sci. Bull., Univ. Kansas, *31*, pt. 1, no. 3: 75-101, 3 pls., 23 figs. May 1, 1946.
3. The status of *Scelo*p*orus floridanus* Baird. Sci. Bull., Univ. Kansas, *31*, pt. 1, no. 4: 103-106. May 1, 1946.

Smith, Hobart M., and Leonard E. Laufe.
A summary of Mexican lizards of the genus *Ameiva*. Sci. Bull., Univ. Kansas, *31*, pt. 1, no. 2: 7-73, 2 pls., 7 figs. May 1, 1946.

Stickel, William H., and Lucille F. Stickel.
Sexual dimorphism in the pelvic spurs of *Enygrus*. Copeia, *1946*, no. 1: 10-12, 2 figs. April 30.

Walker, Charles F.
The Amphibians of Ohio. Part I. The Frogs and Toads (order Salientia). Sci. Bull., Ohio State Mus., *1*, no. 3: 1-109, 14 pls., 28 figs. 1946.

Wilson, L. Wayne, and Saufley B. Friddle.
Notes on the king snakes in West Virginia. Copeia, *1946*, no. 1: 47-48. April 30.

NEW SPECIES AND SUBSPECIES

1. *Alligator mefferdi*, spec. nov. 1946. Mook, Amer. Mus. Nov., no. 1311: 1-4, fig. 2-6. (March 11).
2. *Arizona elegans blanchardi*, subspec. nov. 1946. Klauber, Trans. San Diego Soc. Nat. Hist., *10*, no. 17: 328-333. (March 29).
3. *Arizona elegans philipi*, subspec. nov. 1946. Klauber, *ibid.*: 333-340.
4. *Arizona elegans expolita*, subsp. nov. 1946. Klauber, *ibid.*: 340-343.
5. *Arizona elegans noctivaga*, subsp. nov. 1946. Klauber, *ibid.*: 343-350.
6. *Arizona elegans eburnata*, subsp. nov. 1946. Klauber, *ibid.*: 351-364, pl. 8, fig. 1.
7. *Arizona elegans candida*, subsp. nov. 1946. Klauber, *ibid.*: 364-372, pl. 8, fig. 2.
8. *Arizona elegans pacata*, subsp. nov. 1946. Klauber, *ibid.*: 379-381.
9. *Atractus sanctaemartae*, spec. nov. 1946. Dunn, Occ. Papers, Mus. Zool., Univ. Mich., no. 493: 2-6. (April 16).
10. *Crotalus gloydi lautus*, subspec. nov. 1946. Smith, Sci. Bull., Univ. Kansas, *31*, pt. 1, no. 3: 75-78, pl. 3, fig. 1. (May 1).
11. *Leptotyphlops anthracinus*, spec. nov. 1946. Bailey, Occ. Papers, Mus. Zool., Univ. Mich., no. 492: 1-5. (April 16).
12. *Sphaerodactylus cochranae*, spec. nov. 1946. Ruibal, Amer. Mus. Nov., no. 1308: 1-4, figs. 1-5. (Jan. 24).

Editor's Note—This new feature will continue in each issue of Herpetologica. Please inform the compiler, Mr. Albert G. Smith, of any omissions. Address, P.O. Box 526, Ann Arbor, Mich.

The Identity of Certain Specific Names in *Thamnophis*

By HOBART M. SMITH and BRYCE C. BROWN

In 1942 (Zoologica, 27:98) Smith suggested that Jan's *Tropidonotus kennicotti* (Elenco Eist. Ofidi, 1863:70) might be a synonym of *Thamnophis sirtalis parietalis* (Say). No other opinion has ever been offered. Another disposition, however, seems much more probable.

The only information available on the name and the specimen to which it was applied is furnished in Jan's original description, which scarcely warrants the flattery of being called a description, but does comply with the International Rules of Zoological Nomenclature for making the name available. The only facts given are that the supralabials are 8, the preoculars 1, the postoculars 2, the scale rows 21, and that the specimen is from North (or northern) America. By implication Robert Kennicott may have sent or collected the specimen.

According to Ruthven's summary of *Thamnophis* (Bull. U.S. Nat. Mus. 61:40-41, 1908), only 3 species may be expected to have the combination of 21 scale rows, 1 preocular and 8 supralabials. These species are *T. marciana* (Baird and Girard), *T. radix* (Baird and Girard) and *T. macrostemma* (Kennicott). In 36 counts of the first species (Smith, *op. cit.* 114) the postoculars are 3 in 14, 4 in 22. In 399 counts of *T. macrostemma* the postoculars are 2 in 12, 3 in 349, 4 in 38 and in no specimen are there 2 postoculars on both sides. No precise statistics are available for *T. radix*, but Branson (Univ. Kans. Sci. Bull. 2:363, 1904) says the postoculars are "occasionally" 2, although usually 3, and Hudson (Nebr. Cons. Bull., 24:75, 1942), on the basis of counts on 41 specimens, says that the postoculars are 2-4, usually 3.

Accordingly it seems probable that, having 2 postoculars, the type of *T. kennicotti* is most reasonably regarded as conspecific with *T. radix*. Geographic probability and association of Kennicott's name* support this conclusion. This type locality, vaguely stated as North (or northern) America, is herewith restricted to that of *T. radix* (*viz.*, Racine, Wisconsin).

Another name whose identity has been unsettled is *Eutaenia ornata* Baird (Rept. U.S. Mex. Bound., 1859:16, pl. 9). Ruthven (*op. cit.*: 158) regards it as a synonym of *T. eques* (Reuss). The original description consists of the plate, a list of 3 specimens (from Indianola, Texas; Lower Rio Grande, Texas; and San Antonio, Texas), and a reference to

*Kennicott lived in the Chicago region, where *T. radix* is well known, for much of his life. See Schmidt, Progr. Act. Chicago Acad. Sci., 7:3-7, 1936.

Baird and Girard's description (Cat. N. Amer. Rept., 1853: 28-29) of a specimen from "Between San Antonio and El Paso; Col. Graham which in the latter article they referred to *Eutaenia parietalis* Say. Unfortunately the plate explanation gives no locality for the specimen illustrated; the figure does, however, clearly illustrate *T. s. parietalis*. For two reasons it appears that the illustration is of Col. Graham's specimen and not of any of those listed in 1859: (1) specimens from the area outlined by the latter specimens have a pattern (no fusion of upper rows of spots) different from that shown; and (2) Cope (Ann. Rept. U.S. Nat. Mus., 1898 (1900): 1079) lists a specimen from "El Paso, Texas," collected by Col. Graham, as a "type," not specifying of what. Presumably this means type of *E. ornata*. Baird's illustration, then, may be interpreted as based upon the specimen described by Baird and Girard in 1853; it entirely fits their description. That Baird's intention was to base the name upon the description previously published is evidenced by the reference to it and the complete omission of any description in the 1859 work.

It is evident therefore that the type localities of *T. ornata* are not as stated by Smith (*op. cit.*: 99), including all the localities cited by Baird (1859), but is instead "Between San Antonio and El Paso." The type was (*fide* Cope) U.S. Nat. Mus. No. 960. Cope lists it from "El Paso." Inasmuch as *T. s. parietalis* is not known in the San Antonio area, but has been recorded in the El Paso region, the type locality is, following Cope, herewith restricted to El Paso. Synonym with *T. s. parietalis* is unquestionable.

Summary

Tropidonotus kennicotti Jan. 1863 is a synonym of *Thamnophis radix* (Baird and Girard) 1853. Its type locality is restricted to Racine, Wisconsin. Location of the type specimen is unknown.

Eutaenia ornata Baird is a synonym of *Thamnophis sirtalis parietalis* (Say); its type locality was originally stated "Between San Antonio and El Paso," and is here restricted to El Paso. The type was originally U.S. Nat. Mus. No. 960.

TEXAS A. & M. COLLEGE, COLLEGE STATION, TEXAS

Rana palustris (Le Conte) in Texas

By HOBART M. SMITH & BRYCE C. BROWN

The occurrence of this species in Texas is suggested by its extensive distribution in the eastern part of the United States and records from northern Louisiana, Oklahoma, and southern Arkansas. No definite records from Texas have, however, been published to our knowledge, and Dr. A. H. Wright has kindly informed us that he also is aware of no records of occurrence either published or unpublished. It is therefore of interest to report six specimens (Nos. 1345, 1346, and 1349-1352 in the B.C. Brown Collection) from Normangee State Park, Leon County, Texas, taken by the senior author on March 2, 1946. Two additional specimens are in the Texas Cooperative Wildlife Collection at A. & M. College from three miles east of Riverside, Walker County, Texas. One (No. 79) was taken by W. Smith on July 28, 1936, and the other (No. 486) two days later by S. D. Hinton.

The typical pattern in these specimens consists of two rows of large, dark, light-bordered, narrowly separated, rectangular spots extending from the eyes to the anal region between the dorsolateral folds. The spots tend to fuse anteroposteriorly, forming broad, broken, dark bands as in No. 1349, which has both rows of spots fused except for the last spot in both rows in the anal region. There are two lateral rows of smaller, more rounded spots on either side; the spots in the lower row on some specimens are faint and irregular in outline. The dorsolateral folds are typically broad and silvery and the legs are barred. The freshly-preserved specimens have the characteristic orange color on the groin and legs. The skin is smooth on all individuals.

All of the specimens are females. As they are all so nearly alike in size only the measurements of No. 1349 are cited. These are: snout to vent, 64 mm.; femoral length, 31 mm.; tibial length, 36 mm.; length of foot, 49 mm.; fourth toe (longest), 32 mm.; head at widest point, 24 mm.; snout to tympanum, 17 mm.; diameter of tympanum, 5 mm.; diameter of eye, 7 mm.

A. & M. COLLEGE, COLLEGE STATION, TEXAS

The European *Anguis fragilis* in Captivity

By J. KENNETH GOODY

The "slow worm" is found throughout the British Isles except in Ireland. It is less plentiful in east and north England than in the south and southwest where it is reasonably abundant. Outside the British Isles it has wide distribution. Its popular names are not appropriate to the agile, bright-eyed lizard; "slow worm," "blind worm" and "deaf adder."

It has a small mouth and must exist on small animals, almost exclusively slugs in this case. It will, however, eat spiders, small earthworms and insects. In captivity it often refuses everything except slugs. In the wild it captures slugs at dusk when they come out to feed.

It is ovoviviparous. In August or September the females have from six to twelve young, usually enveloped in an egg membrane which they quickly rupture. The young are silvery in color with a central black stripe and black undersides. They are at once able to catch their own food and fend for themselves. They are from two to possibly three inches long when born.

The tail of the female is shorter than that of the male. Their strength is surprising as they cling to one's fingers or squeeze from the hands. They can snap off the tail or stand on it in endeavoring to climb out of an enclosure. They enjoy burrowing in soft mud and it is interesting to see how mud and water run off their shiny exteriors as they emerge.

During the winter I kept the specimens in a heated room until March when they were placed in an unheated shed. Here they hibernated, one in mud, the other in moss. Ten days later they were returned to the house where they commenced eating again, but less actively than before. By the end of March their appetites decreased and they changed from a glossy brown to a creamy brown. The male shed in early April and the female a few days later. After shedding they ate heartily. This was their first shedding since I acquired them in August, 1945.

CHESHIRE, ENGLAND

A Simple Method for Collecting Lizards

By BRYCE C. BROWN

Texas ranchers are reluctant to allow guns of any kind to be fired upon their property even though they may be loaded only with dust-shot, and many will allow no guns at all. Also Texas has a law against shooting of any kind from the highway. Therefore, in order to secure lizards from the roadside and to be allowed to collect upon ranch property, it was necessary to devise some other method of securing lizards. The one developed not only is very effective and simple to use but also is very economical and does little or no damage to the specimen. It may also be pointed out when large series of specimens are ordinarily taken with collecting pistols, this method will serve as a cheap and easily obtainable supplement to expensive and hard-to-obtain dust-shot shells.

The technique consists of manually discharging a chain of rubber bands as a missile which strikes and stuns the lizard. The projectile is not made of ordinary rubber bands but of specially prepared ones 3/8 inch wide, cut from a "live" natural rubber bicycle inner tube. Three of these bands are linked together to form a chain. Bicycle inner tube bands have a nearly ideal elasticity and weight, serving to stupefy or kill lizards of either large or small size according to the tension used; with maximum tension they will stun a *Crotaphytus* at a distance of 10 feet and with a lesser tension a smaller lizard can be stunned at the same distance without damaging it. The knots formed when linking the individual bands together serve to add weight and help stun the animal. Rubber bands cut from automobile inner tubes have been found to be too heavy and non-elastic to serve efficiently.

In firing the linked rubber band one end is looped over the tip of the index finger of the right hand. The other end of the band is grasped between the thumb and index finger of the left hand. The right hand is then extended to arm's length with the back of the hand upward and the index finger extended vertically while the other fingers remain folded. Tension is applied by drawing the left hand back towards the body more or less at eye level, the rubber band being aimed at the target at the same time. The missile is released by relaxing the fingers of the left hand, allowing the rubber band to fly off the index finger of the right hand and strike the target.

Practice can produce such efficiency that many specimens will be taken which would otherwise be lost if an attempt was made to collect them by ordinary means. Best results are obtained by shooting as nearly as possible at right angles to the surface on which the lizard is resting. If the speci-

men is not secured at the first shot, a second try is usually possible as most lizards are not unduly alarmed when a rubber band hits close to them. Experts can depend upon securing about 90% of the specimens shot at.

COLLEGE STATION, TEXAS

One of our members, Mr. Wm. H. Woodin III, secures his lizards with a slingshot using pebbles for ammunition. He is an excellent shot, above the attainment of the average collector. As a boy I used to carry No. 8 shot in a pocket and when a target appeared I would place about a third of a teaspoonful of shot in my mouth and then deposit it in the pocket of the slingshot. The shot, held together to some extent by saliva, made a very good pattern for killing lizards up to 15 feet distance.—Ed.

Addresses of our European Colleagues

Dr. Doris Cochran kindly forwarded a letter from Dr. F. Angel, parts of which may be of interest to our readers: He is still working despite his retirement, on the lizards of French Africa and at the same time training M. Guibe in amphibians. He forwards addresses of European herpetologists. F. Angel and M. Guibé, Mus. d'Hist. Nat. de Paris, 29 Rue Cuvier, Paris Ve. France. Gaston DeWitte and Dr. Laurent, Mus. d'Hist. Nat. de Belgique, 31 Rue Vautier, Brussels, Belgium. Dr. Brongersma, 'sRijks Mus. van Natuurlijke Hist., Leiden, Holland. Dr. Monard, Mus. d'Hist. Nat. de la Chaux de Fonds, Switzerland. Dr. Hediger, Naturhistor Mus., Augustinergasse, Basel, Switzerland. Dr. Otto Wettstein, Naturhistor. Mus., I, Burgring 7, Vienna, Austria. Dr. Scortecci, Mus. Civico di Milano, Corso Venezia, Italy. Dr. Mertens, Senkenberg Mus., Victoria Allee 7, Frankfurt am Main, Germany. Dr. E. Ahl, Zool. Museum, Invalidenstrasse, 43, Berlin, Germany. H. W. Parker and Mr. Battersby, British Museum (Natural History), Cromwell Road, London, S.W. 7, England. Malcolm Smith, Lane End, Putney Heath Lane, S.W. 15, and Mr. Lester, Zool. Soc. of London, Regent's Park, London, N.W. 8.

Subspecies

If one specimen differs from a series from another locality it may be a different species, but without a series one cannot definitely prove it to be a subspecies.

Dr. Doris Cochran, New Bahama reptiles, Jour. Wash. Acad. Sci., Vol. 2, 1944, p. 101, diagnoses three new subspecies. She does not mention the number of specimens examined, but gives evidence that there were more than a single one in each case except in the diagnosis of *Leiocephalus carinatus punctatus* wherein only the type is mentioned.

Dr. Cochran writes that: "There are 22 paratypes; 5 from Crooked Id., 8 from Castle Id., 8 from hills near Cornucopia Wells, Acklin Id. and 1 from simply Acklin Id."—C.G.

Feeding Habits of Some Reptiles

By GEORGE F. KNOWLTON

I. The Sagebrush Swift

During the study made to determine which injurious insects were being eaten by lizards occurring on range lands of Utah, several collections of *Sceloporus graciosus graciosus* (B.-G.) were made in the Mt. Carmel area of Utah, most of the specimens being taken near Zion Park Junction where the Mt. Carmel highway meets North-South highway 89. Vegetation was chiefly sagebrush, rabbitbrush, and Russian thistle, at places where collections were made.

Recognizable insects found in the 80 *S. g. graciosus* stomachs examined were: 20 Orthoptera, including 1 Mantidae and numerous grasshoppers, 15 of which were nymphs; 16 Neuroptera, 14 being ant lion and other larvae, besides one adult specimen of the ant lion; 110 Hemiptera included 2 stinkbugs, 28 adult and 20 nymphal false chinch bugs, and 4 bigeyed bugs; 91 Homoptera, 42 being leafhoppers, among them being 11 beet leafhoppers, also 37 scale insects and 8 aphids were present; 52 beetles, one a larva, 25 weevils being the group most commonly present, with a clickbeetle, a ladybird beetle, and a leafbeetle also being recognized; all but 3 of the Lepidoptera were larvae; 7 of the 14 Diptera were maggots with 4 blowflies and one member of the horsefly family being recognized, as adults; 570 of the 579 Hymenoptera were ants, with 44 stomachs containing these insects, including many of the red harvester ants which keep large spots of ground denuded of all plant growth, thus lessening the livestock carrying capacity of western range lands. Sixteen insect eggs also were present.

In addition to the insects, 10 spiders, 19 mites, 6 ticks, and 6 roundworms also were found in the examined stomachs.

II. The Desert Short-horned Horned Lizard

A half grown horned lizard, *Phrynosoma orbiculare ornatissium* (Gir.), collected at Kosmo, Utah, was placed in a cage containing insects swept from nearby beet-leafhopper host plants, on May 30, 1936. In one half hour this lizard ate 5 beet leafhoppers, 1 *Lygus elisus* Van D. mirid bug, 4 false chinch bugs, 1 *Chloropisca glabra* Meig. fly, 1 grasshopper nymph and two harvester ants. Another *ornatissium* ate only one grasshopper nymph during a similar interval of time. A horned lizard of this species was placed with several boxelder bugs five days later for one hour, but failed to eat any of these; next day this lizard ate three one-third grown grasshopper nymphs and a blister-beetle, *Epicauta maculata* (Say), in the 30 minutes it was under observation.

A three-fourths grown *P. orbiculare ornatissium,* collected at Locomotive Springs, Utah, on May 30, 1936, and brought into the laboratory at Logan, was placed in a jar with a miscellaneous assortment of insects collected on the same field trip. Within 3 minutes the lizard had captured and eaten an adult pentatomid bug, *Chlorochroa uhleri* Stal, and a beet leafhopper. Five minutes later a nymphal *Melanoplus bivittatus* (Say) grasshopper was eaten. Twelve minutes later the lizard followed a tent caterpillar about for 30 seconds, but did not attempt to eat it. Before feeding upon the above insects, this lizard each time showed marked excitement. Slowly and stealthily it moved toward its larger prey until within striking distance; at this stage it stopped for a few seconds, looked over the insect, then quickly seized the specimen. While under observation for several days, this lizard usually captured its prey while the insect was moving. Insects very near to the lizard, or actually on its body, seldom were taken. Insects an inch or two away were captured more readily.

A mature *Phrynosoma platyrhinos* Girard ate two winged big-headed grasshoppers, *Aulocara elliotti* Thomas, within less than one minute on August 20, 1932. In both cases the process was similar and like that observed in the field by horned toads, sagebrush swifts and brown shouldered utas, on various occasions. The lizard quickly darted forward, seized the grasshopper firmly in its mouth, immediately swinging its head forcefully downward and from side to side, beating the grasshopper against the ground until the prey was badly damaged. After raising its head, the lizard each time swung the forepart of its body from side to side for a few seconds, this activity apparently aiding in the swallowing of the grasshoppers. "Gasping" by the horned toad occurred several times, at irregular intervals, after the second grasshopper had been swallowed.

III. The Desert Horned Lizard

A nearly mature desert horned toad, *Phrynosoma p. platyrhinos* Girard, captured three days previously at Locomotive Springs, Utah, was placed in a battery jar with approximately 120 western harvester ants, *Pogonomyrmex occidentalis* (Cresson), from 5 to 6 p.m. on July 2, 1932. When first placed in the jar, a number of the ants attached themselves, by means of their mandibles, to the outer folds of the skin around the margins of the abdomen, to the toes and to skin folds at the leg-joints. One ant held tenaciously to the edge of the lizard's mouth, being the first ant to be eaten when feeding began. The *platyrhinos* at first thrashed around violently, which attracted other ants to the attack. Finally the lizard stopped moving, and after approximately three minutes most of the ants detached themselves and left. For more than 30 minutes after beginning to feed, the lizard did not once move its feet. The following figures

represent the number of ants actually eaten by this lizard at the end of each five minute interval, ending at one hour of careful observation: 15, 29, 57, 62, 64, 74, 77, 78, 87, 88, 89 and 89. Most of the time the horned toad remained very still, waiting until an ant came within easy reach, then capturing it by darting out its "lightning-fast" tongue as the head and body moved forward and downward. Once two ants were taken at the same time. Approximately once in each 20 tries the lizard failed to secure its prey. Each time ants began to crawl over the lizard, it would stand motionless, although twice it attempted unsuccessfully to capture ants crawling on its nose. The above feeding record probably was not unusually large, or due to starvation. During the previous day this horned toad had captured and eaten four more than half grown nymphal grasshoppers within seven minutes.

P. platyrhinos confined in a glass battery jar in the laboratory at 94° F. on August 16, 1932, ate 27 *Formica fusca* L. in 15 minutes and a total of 30 in one half hour. When the ants first were introduced, the horned toad stood perfectly still until all ants but one had left its body; the last ant was secured as it was walking upon the nose of the lizard. The securing of ants walking in front of the lizard always was a very quick process, once the horned toad moved to secure its prey. The ants never were "beaten against the ground" as occurred when grasshoppers were taken as food. A smaller *P. platyrhinos* in another jar ate 17 *F. fusca* in 15 minutes, 27 in a half-hour, the total being 30 eaten at the end of an hour.

At the time the above observation was being made, a *Phrynosoma orbiculare ornatissimum* (Gir.) was in a nearby battery jar. It appeared eager to get to the ants in the next jar. However, when 25 *F. fusca* were introduced into its jar and some crawled upon it, this lizard became very excited, dashing around frantically for 3½ minutes. It then stopped and remained motionless for the balance of 30 minutes, not once attempting to feed on any of the ants which passed nearby during this time.

On July 13, 1932, a three-fourths grown *P. orbiculare ornatissimum* was confined in a battery jar at an air temperature of 76° F. It received the harvester ants, *Pogonomyrmex occidentalis,* without undue excitement as they were introduced a few at a time, at the side of the jar, so as not to overly excite the lizard. Thirteen ants were ingested during the first five minutes, 30 at the end of ten minutes, 51 in fifteen, 68 at one-half hour, 84 in forty minutes, 91 being consumed during first hour. Twice this lizard captured and ate an ant that had walked upon its body and up to the area near the mouth. In one instance an ant and the ant pupa it was carrying were taken at once. The day previously, this lizard had eaten

46 *Myrmica scabrinodis* Nyl. of the 50 introduced, in one-half hour; a second but smaller *ornatissimum* which was approximately one-half grown, ate 28 of the 50 ants of this species introduced into its battery jar, in thirty minutes.

IV. The Wandering Garter-Snake

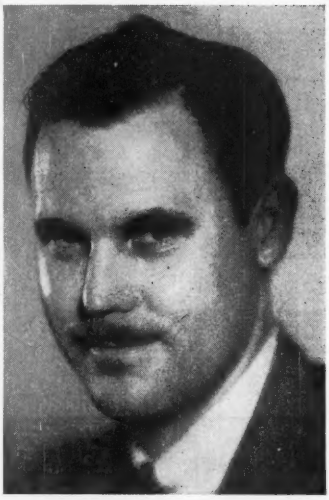
Two specimens of the wandering garter-snake, *Thamnophis ordinoides vagrans* (B.-G.), were collected in the area south of Timpie, in Tooele County, Utah, on September 14, 1934. Each of these snakes recently had eaten the lizard, *Uta stansburiana stansburiana* (B.-G.). The stomach of one specimen contained two of these small utas. In the stomach of the first uta, which was a full-grown lizard, was recognized 5 beet leafhoppers, 1 lepidopterous caterpillar, 1 false chinch bug, 3 adult big-eyed flies, 1 beetle, 1 ant and a number of insect fragments. The second uta which was approximately one-third grown, had recently eaten 3 adult and one nymphal beet leafhopper, 2 big-eyed flies, 1 beetle and 2 predacious big-eyed *Geocoris* bugs. The stomach of the uta contained within the other snake held 12 ants and one other hymenopterous specimen, 1 ground beetle and 1 big-eyed bug. No lizards were present in two additional stomachs of wandering garter snakes collected in this same general area during 1935.

UTAH STATE AGRICULTURAL COLLEGE, LOGAN, UTAH

Trimorphodon lambda, range extension east

A young *T. lambda* (Cope) was found DOR, July 14, 1946, near Bernardino on U.S. Highway 80 in Cochise Co., Arizona, about 15 miles from the New Mexico line. This extends the known range about 50 miles east of Tombstone, Klauber's easternmost record. Specimen in the Wm. H. Woodin collection.

CHAPMAN GRANT & WM. H. WOODIN



Charles Mitchill Bogert
Courtesy Am. Mus. of Nat. Hist.

CHARLES MITCHILL BOGERT, *First President of the Herpetologists League.*

President Bogert was born in Mesa, Colorado, on June 4, 1908, and received his early education in Los Angeles, obtaining his A.B. at the University of California, Los Angeles, in 1934 and his Master's degree in 1936. He served as Technician in the Los Angeles City Schools in 1928; guide in the Rocky Mountain National Park in 1930; Editorial Staff of the U.S. National Park Service (Grand Canyon) in 1932; Teaching Assistant at the University of California at Los Angeles in 1934 to 1936; Assistant Curator in the Department of Herpetology at the American Museum of Natural History from 1936 to 1940; Assistant Curator in charge of the Department of amphibians and reptiles from 1940 to 1941; Associate Curator in Charge from 1941 to 1942; Acting Curator from 1943 to 1944; Curator in 1944; Chairman in 1945; Summer Session Lecturer at the University of California at Los Angeles in 1942 and 1945; Advisory Board Member of the Trailfinder's School, Altadena; Member Zeta Psi, New York Academy of Science (Fellow, 1941), New York Zoological Society (Fellow, 1944), American Society of Ichthyologists and Herpetologists (Member of the Board of Governors, Vice President, 1941-42), Grant-in-aid, Carnegie Corporation in 1939.

Desiderata

Herpetologica will be glad to publish announcements by any student of the problems upon which he is working so that co-operative persons may contribute specimens or literature of aid. Duplication of effort may thus be avoided.

Poisonous Animals Research Laboratory

Dr. Herbert L. Stahnke, Arizona State College, Tempe, Arizona, is the Director of this Laboratory. His work includes poisonous reptiles. Co-operation invited.

William H. Woodin III

Mr. Woodin is one of our recent members. He intends to devote his time to establishing a herpetological institute in Arizona. He desires literature and can furnish Arizona material in exchange. Route 4, Box 584, Tucson, Arizona.

Policy

Herpetologica is the organ of the Herpetologists League. Its policy must be the reflection of the desires of the Members. Please communicate any suggestions or criticisms to the Officers.

Publication

For efficiency our issues are in multiples of 8 pages. We charge contributors $1.50 per page for articles over 3 pages in length plus the engraver's charge for illustrations. Occasionally the editor includes a paper of his to make up a multiple of 8 pages, but he is subject to the same assessments.

Lacerta Nieuws

Lacerta Nieuws is a publication devoted to herpetology and vivariums in general. There are 300 members, many of whom would like to correspond with herpetologists in the U.S. Address correspondence to the Editor, J. Th. ter Horst, Vier Heemskinderenstraat 159, The Hague, Netherlands.

Special Rates for Our Foreign Colleagues

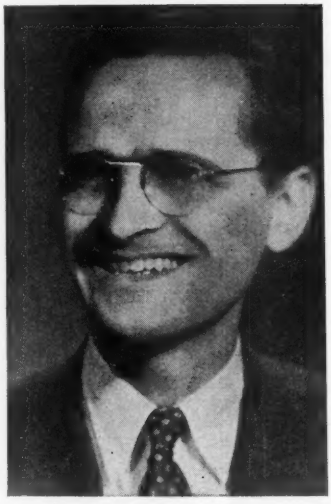
Herpetologica has reduced its subscription price to one half for our overseas members. Thus all paid-up subscribers now will receive Vol. 4 without further payment.

The Young Herpetologists and Naturalists of America

Miss Woods of Indianapolis, Indiana, is the founder of this organization. Strangely the first contribution that we have received from them is the article by J. Kennedy Goody of Cheshire, England, which appears in this issue. They do not publish.

Dermochelys

The Natural History Society of Jamaica mimeographs "Natural History Notes." Address: Dr. C. Bernard Lewis, Director, Jamaica Institute, Kingston, Jamaica, B.W.I. The current issue, No. 27, records the taking of a large specimen of *Dermochelys coriacea* L. at Bull Bay, 10 miles from Kingston.



Hobart M. Smith

DR. HOBART M. SMITH, *first Vice President of the Herpetologists League,* was born September 26, 1912, in Stanwood, Iowa. He lived in Oklahoma and Arkansas prior to obtaining his college training at the Kansas State College of Agriculture and Applied Sciences. Four postgraduate years at the University of Kansas earned an M.A. in 1933 with a thesis on the amphibians of Kansas. In 1936 a Ph.D. degree was received and a thesis upon the *torquatus* group of the lizard genus *Sceloporus* was completed. Both degrees were received with a major in zoology and a minor in entomology under the direction of Dr. Edward H. Taylor.

This was followed by a year at the Museum of Zoology of the University of Michigan, where as a National Research Fellow he studied under Mrs. Helen T. Gaige on the Mexican and Central American species of the genus *Sceloporus.* The remainder of 1937 and early 1938 he studied as a special assistant with Dr. Howard K. Gloyd at the Chicago Academy of Sciences on data accumulated by Dr. Gloyd and the late Dr. F. N. Blanchard for their handbook of U.S. snakes. For several months thereafter he was an Assistant in the department of herpetology in the Chicago Natural History Museum revising their collections of Mexican reptiles and amphibians. In the fall of 1938 he received the Walter Rathbone Bacon Traveling Scholarship ot the Smithsonian Institution and, in company with Mrs. Smith, spent the next two years collecting in Mexico and the following year in Washington studying the material collected.

In 1941 he became an instructor at the University of Rochester, where he remained until the fall of 1945 when he became an assistant professor at the University of Kansas for a semester. In February, 1946, he joined the faculty of the Texas A. & M. College, as associate professor in the department of fish and game.

Herpetological field work during these years included a month in Utah in 1929 with Dr. and Mrs. Gloyd. The summer of 1930 was spent with the same companions in Texas, New Mexico, Arizona and California. In 1931 he collected in Texas and New Mexico with Dr. and Mrs. R. H. Painter of Kansas State College. Three months were spent in 17 states of Mexico in 1932 with Dr. E. H. Taylor where 5,500 specimens were taken. Two months were spent in Mexico in 1934 with Dr. David H. Dunkle, now of the Cleveland Museum. In 1935 three months were utilized collecting in Mexico alone or with Dr. Taylor. Again in 1936 he travelled for several months in Mexico with Dr. Henry Thomas. Finally two years were passed with Mrs. Smith in Mexico in 1938, 1939 and 1940 where some 20,500 specimens were taken.

Societies of which he is a member include Phi Sigma, Sigma Xi, Tau Kappa Epsilon, Kansas Academy of Science, ASIH, New York Academy of Sciences, Biological Society of Washington, Texas Herpetological Society and the Herpetologists League.

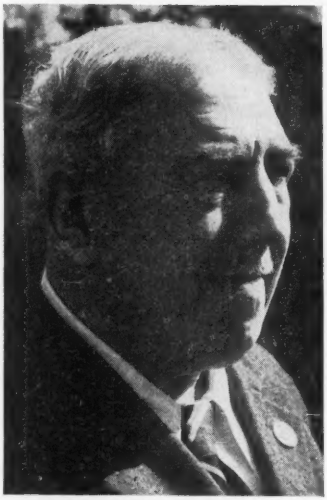
Dr. Smith's publications of some 125 items include one popular book and four extensive summaries.

Our Titles

The title "Herpetologists League" was selected after study of the titles of the 195 organizations associated with the A.A.A.S. It was discovered that the great majority used "American" for the first word although their interests are international. Many names were unnecessarily long, beginning "The Society of . . .," or vague as "Western . . ." Only a very few had the key word first. We sought: (1) The exact meaning. (2) Brevity. (3) The key word first. The two words selected seem to fill the requirements. We applied the same rule in naming our journal. Many journals are inaptly named such as: "American Journal of . . .," "Annals of . . .," etc. The key word is almost lost to view.

Reprints

Our financial condition makes it expedient to forego unnecessary expense. We secure our "reprints" by having an additional hundred copies printed and the pages cut, but not stapled. We staple these according to title and distribute them to the writers at a cent per page. It is therefore apparent that each writer should subscribe for his 100 reprints. If more than 100 copies are needed they may be ordered at the printer's price which is substantially higher.



MAJOR STANLEY SMYTH FLOWER, *O.B.F., F.L.S., F.Z.S. Born 1st August, 1871 — Died 3rd February, 1946.*

Major Flower's ancestors had played a part in American history. Capt. John Smith, the Elizabethan founder of Virginia whose life was saved by Pocahontas, was the first of a line of Smiths or Smyths, who settled in the New World. Admiral William Smyth, F.R.S., 1788-1865, was brought to England during the Revolution. Of his ten grandsons, Stanley Flower was the last survivor. Another grandson was the Chief Scout, Baden Powell, who liked to claim descent from Pocahontas, but his naturalist cousin, lacking documentary evidence, claimed no Red Indian blood.

Richard Flower, 1760-1829, an advocate of freedom of thought, emigrated to America, founded the city of Albion in Illinois and died there. His son, Edward, came back to Stratford on Avon and did much for this Shakespearean town where the family still lives.

During the first twelve years of his life, Major Flower lived in the Museum of the Royal College of Surgeons, London, where the finest zoological collection in the world was housed. His father, Sir William Flower, F.R.S., was conservator of the Museum and President of the Zoological Society of London, and later Director of the British Museum, Natural History. There were seven children, but Stanley, the second son, was the only one who inherited his father's taste for zoology. Before he was able to read or write, he could name most of the animals, living or extinct, either in the Museum or in the Zoological Gardens.

As a small boy he learned from keepers the art of handling snakes and much about the habits and management of animals and his happiest hours were those spent with his father who encouraged his zoological studies. Darwin was kind to this youthful naturalist when he visited the Flower home. Owen and Huxley were his familiar friends. He was allowed to attend meetings at the Zoological Society and knew most of the scientific leaders in London.

In 1896 he accepted the post of Scientific Adviser to the Government of Siam with headquarters at Bangkok. For two years he remained in Siam, putting the museum in order and doing field work. In 1898 he accepted an offer by Lord Cromer of the Directorship of the zoological gardens at Giza, Egypt, where he remained for 25 years. His service was interrupted by the first World War, during which he organized and commanded the Camel Transport Corps on the Canal Zone and in Sinai and Southern Palestine.

Each year a report on the zoological work done in Egypt was published. In 1900 he was appointed Honorary Director of the Game Preservation Dept. of the Sudan. He collected many animals and transported them long distances at great personal effort. He once remarked that if you want to travel for pleasure, do not take a giraffe. His observations on Nile crocodiles were reported year by year.

In 1905 he founded the Giza Zoological Museum. He instituted the Zoological survey of Egypt, personally covering the mammals and reptiles. His work was done without adequate help and with great personal hardship, but without complaint. His maxim: "True happiness lies in unhurried work, not in aimless leisure." His vacations were spent in studying eighty zoos throughout Europe.

After retiring in 1924 he devoted much of his time working at the London Zoological Society, serving on the Council from 1924 to 1936 and as Vice President from 1927 to 1929. Living quietly in Tring he studied salamanders and other forms. A Hartz Mountain salamander presented to him in 1926 is still living in 1946.

He was Member, Fellow or founder of many scientific societies. The Order of the British Empire and many other citations and orders were conferred upon him.

Herpetological Titles of Major Stanley Smyth Flower

1896. "Notes on a collection of Reptiles and Batrachians made in the Malay Peninsula in 1895-96, with a list of the species recorded from that region." Proc. Zool. Soc. London, 1896, pp. 856-914, with 3 plates.

1897. "Notes on the Fauna of Siam." Bangkok Times Press. Bangkok, 1897, pp. 1-9. Reptiles and Batrachians, pp. 5-8.

1898. "On the Identification of a Gecko from Penang" *Gonatodes penangensis*, a synonym of *G. affinis*. Proc. Zool. Soc. London, 1898, pp. 455-456.

1899. "Notes on a second collection of Reptiles made in the Malay Peninsula and Siam from Nov. 1896 to Sept. 1898, with a list of the species recorded from those countries." Proc. Zool. Soc. London, 1899, pp. 600-697 with 2 plates.

"Notes on a second collection of Batrachians made in the Malay Peninsula and Siam, from Nov. 1896 to Sept. 1898 with a list of the species recorded from those countries." Proc. Zool. Soc. London, 1899, pp. 885-916 with 2 plates.

1900. "Notes on the fauna of the White Nile and its tributaries. IV. Reptiles V. Batrachians." Proc. Zool. Soc. London, 1900, pp. 967-968.

1906. "Report on Mission to Europe 1905." Egypt Public Works Dept. Zool. Gardens, pp. 1-43. Cairo 1906. Reptiles, pp. 14, 25-26, 28.

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1908. "Notes on Zoological Collections." Egypt Public Works Dept. Zool. Gardens, pp. 1-71. Cairo 1908. Reptiles & Batrachians, pp. 10-11, 13, 18, 20, 23-24, 28-29, 35, 37, 39, 41-43, 50, 52, 53. "Prices of Animals 1896-1908." Zoologist. London 1908, pp. 281-307. Reptiles, pp. 306-307.

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1921. Egypt. Zool. Service, Publ. No. 34. Report for 1920. Cairo 1921. Reptiles, pp. 11, 13, 15, 17, 18.

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"Loss of memory accompanying metamorphosis in Amphibians." Proc. Zool. Soc. London. 1927, pp. 155-156.

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Aggregation with Cannibalism in Tadpoles of *Scaphiopus bombifrons* with some General Remarks on the Probable Evolutionary Significance of such Phenomena

By ARTHUR N. BRAGG

Cannibalism among tadpoles of various salientian species is well known but among the American forms only those of spadefoot toads (genus *Scaphiopus*) show it in marked degree. Some spadefoot tadpoles seem commonly to attack their fellows, others seem to do it only under special environmental conditions, whereas in still others the phenomenon is rare or non-existent (further observation only will tell which).

In recent years, another phenomenon, sometimes accompanied by cannibalism and sometimes occurring without it, has been observed among spadefoot tadpoles. This is a marked tendency to aggregate at certain times and places. Some are merely the result of many individuals reacting together to a common food object but at times they seem to occur in response to stimuli afforded to each individual by the presence of others, i. e., the phenomenon is social.

A review of reported cases results in the following known distribution among the various species of this genus: (1) A social aggregation is known in all species except *S. intermontanus* and *S. multiplicatus* neither of whose tadpoles have received observation from this viewpoint. (2) Social aggregation is best known in *S. hurterii* Strecker (Bragg, 1944, 1945a) where it sometimes occurs while the tadpoles feed prior to metamorphosis and also, at other times and places, during the earlier phases of metamorphosis, whether the animal continues to feed or not. No active cannibalism has been observed to accompany social aggregation in this species, although these tadpoles are omnivorous. (3) Social aggregation with cannibalism is best known in *S. holbrookii holbrookii* (Harlan), especially from the description of Ball (1936), a portion of whose account is quoted below. (4) Marked carnivorous tendencies have long been known among the tadpoles of *S. hammondii* Baird (and cannibalism has been seen) but I find no report of social types of aggregation in this species. (5) In the most studied of all species of *Scaphiopus* (*S. bombifrons,* Cope), marked aggression toward tadpoles of another species (*Bufo cognatus*) has been described (Trowbridge and Trowbridge, 1937; Bragg, 1940) but active social aggregation with cannibalism has apparently never been noted before this time.

On July 15, 1945, during a protracted period of hot, dry weather, Dr. A. O. Weese and I[1] came upon two areas along highway 283 in Northern Beckham County, Oklahoma, in which *S. bombifrons* had earlier bred. The first of these was at a large, deep, and nearly circular pool swarming with tadpoles in metamorphic stages. Some were already on the bank whereas others were still actively feeding. All over the extensive pool, tadpoles were popping to the surface to gulp air and then returning to the bottom to feed. This distribution of tadpoles appeared to be entirely random except in one small area where some were gathered about plant materials upon which they were feeding voraciously. This aggregation was asocial and there was no evidence of cannibalism. In fact, I saw nothing in the behavior of the tadpoles in this pool not observed hundreds of times prior to this in this species and I cite it as typical behavior to be contrasted with the observations at the second site nearby.

The second area was at a large "borrow pit" four miles south of the first station. Here a large area (estimated surface, about one acre) had been denuded of vegetation and top soil leaving a shallow depression except in the center which was abruptly deeper. Evidently the whole area had been flooded during earlier rains but the evaporation had been excessive and rapid so that now several shallow pools and one central deep one remained, scattered over the denuded clay. All except the deep central pool contained tadpoles of *S. bombifrons* just entering (or in) metamorphosis. Presumably they were of the same age as those mentioned above seen four miles to the north. In all pools except one the tadpoles behaved as expected from former experience. In this one pool (the largest that contained tadpoles) the animals were very crowded. Thousands were present in water about 1½ ft. deep (maximum). The pool had an extent of about 20x10 ft. and was regular in outline. The behavior of the tadpoles in this pool is graphically expressed in my field notes: "The tadpoles were so densely assembled that I scooped them up by the handfuls, filling a strainer. Great 'clouds' of tadpoles moved together, some being attacked by others and eaten. Nearly all were in metamorphosis. I noted that those most commonly being eaten had all four legs. I could not be sure whether 'younger' (i. e., in developmental stage) were being attacked. It is noteworthy that this pool was singularly void of vegetation, the water was warm, and the tadpoles crowded."

Note the similarities in this account with that given for *S. h. holbrookii* by Ball (1936). "No tadpoles were to be found in the shallow water which overflowed from one end of this depression [just previously described]. Over the deeper water appeared what resembled a dense school

[1] We were traveling and studying together under the auspices of the University of Oklahoma Biological Survey (Dr. A. Richards, director) to which acknowledgment is hereby made for equipment and field expenses.

of gyrinid beetles agitating the brilliantly reflecting surface. Closer examination disclosed its true nature; it was composed of thousands of *Scaphiopus* tadpoles in a mass approximately one square meter in area and about 15 cm. in depth. Every tadpole appeared to be trying to climb on top of the mass, those at the thinner margins dashing upon those in the center and forcing them downward and outward. The school moved slowly toward the shallow side of the pit, at the same time dividing like a 'giant amoeba'." Later in the same account, he says, "Next morning the 400 or 500 tadpoles which had passed the night in this pan [holding a portion of the collection] were found literally to be devouring one another alive—. The commotion caused by the struggling predators and prey recalled the behavior of the animals at the pond the preceding day. Although not noticed at the pond, cannibalism was probably in progress in that enormous mass of tadpoles."

From these two almost parallel accounts of aggregational behavior with cannibalism in species inhabiting widely separated areas (Connecticut and Oklahoma) and in two species different enough to belong to separate subgenera, it seems certain that such phenomena are the result of similar protoplasmic response to similar external stimuli. In the Oklahoma observations, the fact that other tadpoles, in all probability of the same age and some even of the same parentage[2] did not behave in this manner further enhances this possibility; and the aggregation of some tadpoles but not of others observed in *S. hurterii* (Bragg, 1945a) is a still further indication of its soundness.

Two basic problems emerge from the consideration of all reported cases of aggregational and cannibalistic phenomena among spadefoots: (1) What is the nature of the stimulus (or stimuli) which calls forth the expression of either or both; and (2) how and why have spadefoots alone among the many other kinds of tadpoles (some developing in the same pools with them) come to show such tendencies—that is, why have such tendencies developed during the evolution of these animals?

Concerning the first of these questions, little can be said. No exact data exist on the chemical and physical conditions in pools where such phenomena have been seen. All observers have so far been too busy in trying to learn *what* was happening to attack the more basic problem of *why* it happened. Also, since no one interested in such matters can know beforehand when he will run into the phenomena, and because conditions in most pools where the phenomena occur change very rapidly, there is

[2] In the second area, every indication was that there had been originally one extensive pool. As evaporation occurred, it would be indeed strange if tadpoles of the same parentage should have all gone into the one pool. There were too many tadpoles here to have come from eggs laid by one female.

often lack of equipment and time at the precise period when they are most needed to determine these conditions.

Certain general observations may be made, however: (1) No case of aggregation, either with or without cannibalism, has been found except when the water is warm. (2) None has been observed when there appeared to be an adequate food supply for all tadpoles in the pool. (3) No case has been seen except when the water supply was dangerously depleted, either by drainage or evaporation, or when conditions of weather were such as to make one believe that it soon would be so. (4) In most cases of marked aggregation, and in all cases of this accompanied by cannibalism, the tadpoles have been crowded. On the other hand, (1) warm water alone does not stimulate the animals to behave in this manner; (2) nor does water depletion with consequent crowding. (3) Mere lack of food is not the sole factor, either, at least in *Scaphiopus bombifrons* and *S. hurterii,* as my whole extensive experience with these species demonstrates. (4) Relative clearness or roiliness of water appears negative in their effects since the phenomena under consideration have been seen both in clear and in muddy pools; and tadpoles have developed under each condition at other times and places with neither aggregation nor cannibalism. The situation, therefore, is a complex one, to be explained only by extensive determinations of chemical and physical conditions in many individual pools and a study of their interrelations as effective stimuli.

But, fortunately, knowing the exact causal factors in this situation is not a prerequisite to an attempt at a functional interpretation of the phenomena. The general adaptiveness and directiveness[3] of organic nature leads one to believe that such phenomena have a definite biological function in the survival of the species. I am convinced that this has its evolutionary basis in the Darwinian factor of the struggle for existence in xeric environments during phylogeny. The remainder of this paper presents the evidence for this view.

In earlier papers (Bragg, 1944, 1944a, 1945) it has been shown (1) that the xeric pattern of reproductive behavior as exemplified by *Scaphiopus* is exactly and nicely fitted for having the eggs laid at the proper time and in the right place to insure a maximum average survival of the young; (2) that, despite this, even under the best of conditions many tadpoles may be lost through excessive and fast evaporation; (3) that such pools produce many animals in relation to the ultimate plant food and this makes competition among the animals of all groups very intense; and (4) that it follows from these conditions that the fast rate of development and cannibalistic tendencies of typical spadefoot tadpoles tends to favor their development.

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[3] In the sense of Russell, (1945).

What possible survival value could aggregation just before metamorphosis have? Hypothetically, there are at least two possibilities: (1) aggregation with cannibalism could insure the survival of some tadpoles if the food sources had become low. Starting with hundreds of tadpoles in a single pool, each individually small, the bulk of the temporary water large, and evaporation rate not excessive (although the latter might not be true), each would, on the average, have an equal chance to find food. Growth rates, so far as determined by external conditions, should be approximately equal, the growth of food plants (largely algae) should increase with the growth of the tadpoles, and all tadpoles should get on well during the first part of their lives. Hundreds of pools have been observed where *Scaphiopus* tadpoles fulfilled these expectations. As the water warmed and evaporation rate increased several interacting factors would tend to make conditions less favorable to individual tadpoles: (a) shrinkage of the pool, coupled with the now increased individual size of the animals would tend to make for crowding; (b) crowded tadpoles might not eat as well as uncrowded ones[4]; (c) the animals now require more food per individual, partly because of increased size, but also because the developmental rate tends to increase with increase in temperature; but (d) plant food might not be so abundant partly because the rate of growth of the animals may tend to exceed that of their food plants and partly because the conditions now present in the pool might make it more difficult for the proper plants to grow.[5] What ever the causal factors are, I have seen many cases in depleted pools where the tadpoles were running out of food just before their metamorphosis.

As the tadpoles come together more frequently, if one should be injured it could easily be attacked by hungry fellows. Social feeding as recently described (Bragg, 1945a) or asocial aggregation while feeding from a commonly attacked food object, therefore, could easily change to vicious cannibalism in evolution if it had survival value for a species and if the basis for the habit should become fixed in heredity through natural selection.

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[4] Found in *Rana* but doubtful in *Scaphiopus*. See Adolph (1931).

[5] This is a matter which needs further study. I have conferred with several botanists all of whom have assured me that the algal flora of such pools *might* decrease under the conditions stated, but none could be *certain* that it would do so. One, however, said that he would expect it. I myself have seen pools, swarming with tadpoles where no algae were macroscopically visible and in one case the tadpoles seemed to be utilizing something in the bottom mud (possibly unicellular forms), for they were swallowing large quantities of this mud. (Bragg, 1945a)

Some unpublished observations on *S. intermontanus* illustrate this graphically.[6]

"At the Price City reservoir on June 16, 1930, I was able, however, to observe that these tadpoles in the small pools developed by seepage from the reservoir were found clumped together in groups, and I made a note of this fact. My observation, however, was that probably they were aggregated for the purpose of feeding on the algal growth that seemed to be forming on small sticks and straws in the pools. As soon as they were disturbed they scattered to various parts of the puddles, but would soon return again. In several instances the tails of small tadpoles were about half removed. As I observed the tadpoles in a number of pools, it seemed that they were sucking at the tails and body parts of some of the smaller tadpoles. It never occurred to me at that time that this may be a cannibalistic habit, but I do have notes of the fact that they seemed to be 'sucking the algal or plant growth that may be on the tadpoles, and using same as food.'

"The large tadpoles that had started to develop legs seemed to dominate the pools, and the small ones would scatter as soon as the larger ones were disturbed."

Apparently the nibbling of algae from other tadpoles in this case did not always stop with the plant material, particularly in the thin tail region. This might be called incipient cannibalism or incidental cannibalism and one can easily understand how carnivorous tadpoles could through such means become active cannibals under adversity. It is interesting, too, that larger tadpoles should have been "dominant" in the pools. This may have some significance in connection with the differential rates of development in *S. hammondii* (Bragg, 1941) since *intermontanus* inhabits a very xeric region (see below).

Pools occupied by these tadpoles may be shallow and small, deep and extensive, or anywhere between these extremes. By far the greatest number of pools are intermediate in both depth and extent and, in these, chances for survival vary enormously with local conditions. Sometimes the tadpoles have no difficulty in rather shallow pools; but very often whether they survive or not depends upon a difference of as little as an hour or two taken in the total time of development to metamorphosis. Any factor favoring even slightly their survival, as by increasing rate of development under such extremely adverse conditions, may make all the difference between annihilation and survival. Now if food is depleted (a very common condition in a fast disappearing pool) the rate of develop-

[6] Quoted from a letter to the author by Dr. Vasco M. Tanner in answer to my inquiry as to behavior of tadpoles of this species. I am indebted to Dr. Tanner, the only one who has observed tadpoles of the intermontanus spadefoot, and who generously permitted my use of his observations.

ment tends to be slowed and, under adversity, it is much better biologically that some individuals be sacrificed as food for the others than that all should perish. It seems clear, therefore, that cannibalistic behavior under such adversity does have a survival value for the species, for by it some individuals are able to survive to inhabit the land and (other dangers excluded) to mature to produce another generation. It is very significant that aggregation with cannibalism has been reported *only in tadpoles in or near metamorphosis and only in pools dangerously depleted by drainage or evaporation.*

(2) Some observations made recently on *S. hurterii* indicate that aggregation without cannibalism may also have survival value in a fast disappearing pool. The pool designated as Pool B in a recent paper (Bragg, 1945a) had nearly disappeared as the tadpoles approached metamorphosis. The tadpoles aggregated in various places on the bottom of the pool which now had a depth of not more than two inches. Some of the aggregations occurred in natural small depressions but others did not. In either case, within a few hours, all of the aggregations lay in bottom depressions each just slightly larger than the tadpole mass it held. Observation showed that these depressions were made or deepened by the lashing of the tails of the aggregated tadpoles. Rain replenished this pool just as the animals began leaving it, but had it not done so the animals would have had a better chance of survival due to the deepening of local areas of the bottom which would have cut down the surface exposed to evaporation. This alone could easily have resulted in survival of many tadpoles as the pool dried up. At Pool C (*loc. cit.*) where the water eventually disappeared and all tadpoles died, their behavior as the water level fell indicated the same thing. They became clustered in the bottom depressions which they seemed reluctant to leave except rarely and then only in groups, although there was sufficient water between the depressions to enable them to pass out easily.

To summarize, it appears, therefore, that aggregation with cannibalism such as is known to be manifested at times by *S. h. holbrookii* and *S. bombifrons* is a directive effort toward the goal of survival or, to put it another way, an adaptive response to external stimuli, developed in evolution as if as a supplement to the xeric breeding pattern of the adults to the end that at least some young shall, on the average, survive the rigors of existence during the rapid drying of the pool accompanied by a depleted food supply. Aggregation without cannibalism, observed so far only in *S. hurterii,* is a similar adaptive response tending on the average to conserve the necessary but fast disappearing water in the often very close race between rate of development and rate of evaporation.

Two observations are, however, not completely explained by the above: (1) the social aggregation of *S. hurterii* tadpoles where there is plenty of water (Bragg, 1944) and (2) the marked difference in developmental

rate among individuals of the same age and in the same pool in *S. hammondii* (Bragg, 1941). The first of these may be explained if we assume that the sum total of conditions in this pool (or the effective causal proportion of them) caused the tadpoles to respond as they would have done had the pool been drying up. Since the tadpoles in all probability are not conscious of the results of their behavior, similar causal conditions (whatever they may be) may have given similar results, so that the tadpoles behaved in a way totally unnecessary in this particular time and place. It is as though the tadpoles had been tricked into this unnecessary behavior by stimuli ordinarily experienced only when such behavior is biologically desirable. Whether this assumption is justified or not must await the determination of the causal factors in the phenomena under consideration.

In the case of *S. hammondii*, we know too little as yet to make anything but a suggestion. It may be that the evolutionary adaptations have taken the form of a segregation of individual development rates (some individuals developing much faster than others) in order that, should the water disappear too fast, the few larger individuals can feed upon the smaller and thus enhance their chance for survival. The only real evidence for this is (1) that this species is known to be markedly cannibalistic and (2) larger individuals attacking smaller ones probably can do so with less chance of mutilation of themselves. Aggregation has not been described in this species but may occur. If so, then the larger tadpoles obviously would have a better chance of survival as each individual attacked others adjacent to it. It may also be significant that *S. hammondii* tends to inhabit the most xeric regions of the United States. Probably, over the total range of each, the habitat of this species is more xeric than that of any other species except *S. intermontanus* about which very little is known. The peculiarly constructed heavy jaws and exceptionally large jaw muscles of these tadpoles may also be morphological adaptations correlated with the necessities of a larval life in especially xeric regions.

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UNIVERSITY OF OKLAHOMA, NORMAN, OKLAHOMA

Anolis cristatellus in Captivity

By RICHARD A. SPIELER

On June 7, 1945, I received an adult male *Anolis c. cristatellus* from Arecibo, Puerto Rico, which was kept in a vivarium with two *A. carolinensis* until January 1946 when it died. At first it refused to eat voluntarily, but later took house flies and it was force-fed on various insects. It drank drops of water from the floor, raising its head occasionally to let the water run down its throat. At other times it was given water with an eye-dropper. When stroked it would turn dark immediately anterior to the place where it was stroked. *A. carolinensis* reacts in the same way. It did not shed as often as the "chamelions" did. It shed October 5th to the 7th and ate the skin except that of the tail. When first received it was vicious, opening its mouth when picked up, but later on it had to be provoked to make it open its mouth to be fed. It was noticeably more nervous than the "chamelions." It did not appear to be as arboreal as the "chamelions," climbing into the vegetation only to sleep at night.

ROCHESTER, N.Y.

Mating of the Pilot Blacksnake

By ROMEO MANSUETI

I was fortunate in having the opportunity to observe the complete copulatory process of the pilot blacksnake, *Elaphe obsoleta obsoleta* (Say). The following notes are a contribution to the life history of this common, but little known species. A fine male colleced on June 9, 1940 near McConnallsburg, Pennsylvania was confined with a female taken in Baltimore County, Maryland on June 12. The male was chocolate colored, nervous and inclined to be vicious and so remained as long as I had him. He would vibrate his tail loudly at the slightest disturbance and strike at anything. The female was docile, black with a white ventral surface. She reacted in a gentle manner when collected and so remained until I preserved her.

This pair was inclosed in adjacent cages with only a slight partition to block their view. The male showed decided interest in the female by moving about excitedly at certain periods of the day. I am not sure whether it was scent or sight of the female which attracted the male. The female was indifferent to the male.

As soon as they were together, the male became very excited and bit at me with two rapid jabs as I placed my hand in the cage. He began to jerk his body in short quick movements as he crawled over the female, rubbing his coils over her. This was continued about three minutes and then he gradually extruded his hemipenes, guiding the posterior portion of his body to the tail of the female. After several moments the male inserted his hemipenes into the vent of the female with little difficulty, the female appearing unconcerned. The male seemed to hold the female in place by the muscular power of his coils. His head was about three inches behind that of the female. (Fig. 1). Every 4 or 5 seconds the lateral portions of the male's body would twitch. This spastic contraction of the muscles continued, but the female remained passive. Each slight movement on the part of the female would cause the male to follow eagerly which made them appear to be clasped together at all times.

The tails were curved conveniently to allow an embrace, but were not entwined. The tail of the male wriggled vigorously and he continued to move spasmodically throughout the 17 minutes of copulation. The mating took place just after twilight; from 8:15 to 8:32 P.M. on June 12. The male slowly withdrew his penes and crawled away, but still in a jerky manner. He drank a large quantity of water and showed no further interest in the female for the rest of the summer. The female remained calm, coiled in a corner of the cage for the rest of the night. Both specimens had eaten mice several days before mating. Mr. Thurman Sewell was co-observer.

On July 21, 1940, 37 days after mating, the female laid 12 eggs on the floor of the cage between 10:00 A.M. and 3:00 P.M.

A small slender female collected at Woodstock, Maryland by Mr. George Maugans also laid 12 eggs on the same day. Mr. Maugans had observed this female mate with a small male in the woods of that area on June 8. The average size of each series of eggs agreed, despite the difference in size of the two pairs of parents.

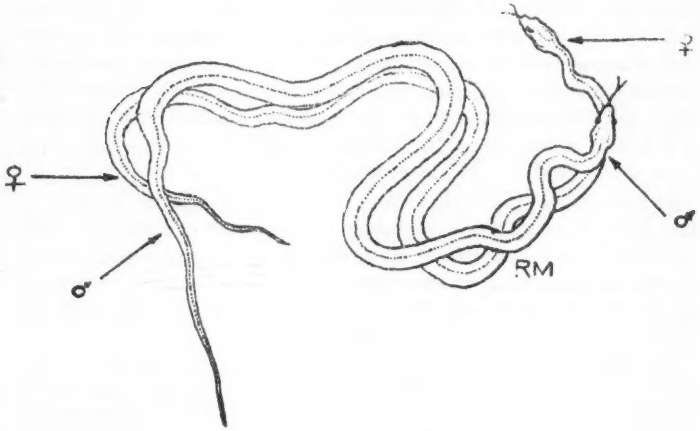

FIG. 1. Mating position assumed by *Elaphe obsoleta obsoleta* (Say).

The eggs were laid in a haphazard manner all over the cage, only two adhering. The eggs were white and smooth, resembling bantam or pigeon eggs, but after several hours they began to show slight indentations. This was immediately remedied by placing them in slightly moist wood pulp which was remoistened every two days. Some of the pulp adhered to the eggs, staining them and making them appear rough. The snakes took no notice of the eggs after they were laid. The day after being laid the eggs of the large specimen averaged 42.2 x 20.6 mm. and those of the smaller specimen 37.6 x 21.6 mm.

On July 24, one egg was cut open and the embryo was very small, with large body and eyes. The bulk of the egg was composed of creamy yolk, somewhat bloody. The body pulsated for about 10 minutes before dying. The body was cream color, the vertebral tissues visible, the body coiled like a watch spring. The hemipenes were not visible or the specimen may have been a female.

On August 7 another egg was opened and the body of the embryo was translucent, uniform in color, with tiny granular scales and everted hemipenes. Another was opened on August 13. The embryo was somewhat larger; eyes and head very large and body coiled. It remained alive about 20 minutes. The next was opened August 30. It was cream colored with indication of dorsal blotches. The scalation was granular and hemipenes not visible; eyes large. The eggs had grown considerably in bulk from time of laying. The August 30 specimen measured 196 mm. and had approximately 49 faint brownish blotches. On September 8 I opened another egg. The embryo had taken on the appearance of a juvenile. It was 253 mm. long; had absorbed most of the yolk, but the cord was attached to the yolk which in turn was attached to the walls of the shell. The cord was located about an inch anterior to the vent. The ground color was gray with 52 dorsal dark brown, squarish blotches; head normal in proportion, but the eyes projected more than in a hatched specimen. The venter was whitish, checkered with black; scales perfectly formed but no evidence of keels apparent.

On September 13 I noticed that 4 specimens had slit the tops of the eggs for about a half inch. Throughout the day the snakes remained in the eggs with only their heads protruding. When disturbed they would withdraw their heads for a few moments. They would flick their tongues out when they felt any vibration. One specimen emerged during the night and spent the morning under a piece of bark. On September 14 the other three left their shells and sought to escape. They were sleek and brightly hued. All were hatched by September 16. Two specimens measured 324 and 273 mm. with 57 and 50 very dark brown, squarish blotches on a grayish ground color. The keels were only slightly evident. They were very vicious, biting at the slightest provocation. For several weeks they would remain active throughout the day, but after that they remained beneath bark during the day. They bit by drawing the head back in an "S" shaped curve and then striking with open mouth and drawing away after biting.

The hatchlings shed their delicate velvety skins about 2 or 3 days after hatching and usually thereafter drank readily. One ate meal worms and another a tiny fence lizard three weeks after hatching.

BALTIMORE, MARYLAND

A New Hyla from South Texas

By BRYAN P. GLASS

A form of *Hyla* entirely distinct from those previously known from the Texas coast was recently discovered on the Aransas National Wildlife Refuge. Collecting on the refuge was done by permission of Mr. C. A. Keefer, the refuge manager, and with the help of Mr. Russel Clapper of the refuge staff. The assistance of Dr. Hobart M. Smith in studying and describing this new form is gratefully acknowledged.

*Hyla Flavigula**

Sp. Nov. Little Green Tree Frog

Holotype. T.C.W.C.† No. 1192. A male, from the Aransas National Wildlife Refuge, Aransas County, Texas. Collected June 20, 1946, by Bryan P. Glass. *Paratypes.* T.C.W.C. Nos. 1191, 1193, and 1194, collected June 20, 1946, by B. P. Glass and Russel Clapper.

Diagnosis. Size small, less than 30 mm. in length; color above unspotted bright green, below white with suffusion of yellow on concealed surfaces of thigh and shank; males with yellow wash on vocal sac; boldly defined yellow stripe from below eye to above insertion of upper arm, broken above shoulder, and continuing in a slightly more dorsal position posteriorly for a variable distance; outline of the lateral line posterior to forelimb not distinct or boldly outlined, but extremely so anterior to forelimb. Heels barely reaching or falling short of tip of snout when adpressed, barely overlapping when thighs are placed at right angles to the body. Skin minutely granular above, areolate on venter and under surface of thigh; pectoral fold present.

Description of type. Head short, wider than long, the snout rounded in dorsal profile; lores slightly concave and sloping at approximately 35°; canthus rostralis a rounded angular ridge; vomerine teeth oval in outline, their lateral extremities slightly forward of the median extremities, choanae and vomerine teeth forming a straight line, distance between vomerine teeth equalling their distance from the choanae on each side. Tympanum less than half the size of the eye separated from orbit by a distance slightly less than its own diameter. Waist narrow. Digital discs distinct, slightly smaller than tympanum; tarsal fold present, extending from ankle to metatarsal tubercle; latter located at base of 1st digit; webbing moderate, terminal phalanx of digits 1, 2, 3 and 5 free, terminal and penultimate phalanges free on digit 4.

*Lat. Flavus, yellow, gula, the throat. Used in reference to the suffusion of yellow on the throat and vocal sac of the males.

†Texas Cooperative Wildlife Collection.

Skin of back minutely granular; ventral surface of thigh and belly from pectoral fold to anus areolate, the areolae being larger in the pectoral region; texture of skin on remainder of body similar to that on the back.

Color bright green above, without spots or pattern of any kind; a yellow line with sharp outlines from under eye passing below tympanum to a point directly above insertion of the upper arm; line briefly interrupted above the shoulder and continuing from a slightly more dorsal position after the interruption almost to the insertion of the thigh; posterior to the forelimb this lateral line is much less boldly outlined than anterior to it; thigh and shank bright green above as in the dorsal body coloration; a suffusion of yellow on the anterior and posterior surfaces of the thigh and on the posterior surface of the shank; an irregular yellow ring around the anus; a distinct yellow line bordering the green of the shank posteriorly, and continuing across the ankle to the dorsal side of the foot ending at the base of the 4th toe; eye bronze, the pupil horizontally elliptical; color below white, a yellow wash present on the vocal sac.

Measurements of the type are as follows: length 26.6 mm., thigh (anus to knee) 14.0 mm., shank 13.5 mm., heel to tip of 4th digit 18.7 mm., interorbital space 7.2 mm., intertympanic width 8.9 mm., greatest width of head 9.1 mm., length of head from posterior edge of tympanum to tip of snout 7.2 mm.

Variation. The amount of variation between individuals in the type series is slight. The most conspicuous variations are in the extent of the lateral line posteriorly, and in the degree of its distinctness. The line is longest and most distinct in the type specimen, shorter and even more indistinctly outlined in the other. The female is larger and lacks the yellow color on the throat. In addition the skin under the throat is areolate, like the belly, rather than smooth as in the males.

Remarks. At first glance these frogs might be mistaken for *Hyla cinerea,* for the body shape and shade of green on the back is similar in both, but *Hyla flavigula* lacks the minute yellow dots that usually characterize the other species. In *H. flavigula* the lateral line is more yellow than in *H. cinerea,* and the interruption above the shoulder and indistinct outline of the stripe on the side of the body are characteristic of the former.

The sharpest difference between *H. flavigula* and *H. cinerea,* other than in the character of the lateral stripe, are the size, skin texture, and voice. In the type series of *H. flavigula* the males are all approximately 26 mm. long, and the female approximately 28 mm. That they were mature when captured is evidenced by the fact that the two solitary males were in full voice, and a pair was taken in amplexus. In the female mature eggs are visible through the skin of the belly. Numerous *H. cinerea* were heard calling at the sites where *H. flavigula* was found. Two large males

of *H. cinerea,* 39 mm. and 48 mm. respectively, were taken in addition to 5 young ones approximately 19 mm. long. The contrast between juvenile *H. cinerea* and *H. flavigula* in color characteristics and skin texture is as clear as between the adults.

The skin of *H. flavigula* is so minutely granular by contrast with the condition found in *H. cinerea,* as to appear smooth until examined under magnification.

In characteristics of the voice there is no difficulty in separating *H. flavigula* from *H. cinerea.* The voice of *H. flavigula* is a "honk-honk, honk-honk," pitched lower than the call of *H. cinerea,* and lacking the nasal quality so characteristic of the latter. At the collecting sites as well as at many other localities *H. flavigula* was far more abundant than the several other species, including *Hyla cinerea, Bufo valliceps, Microhyla olivacea,* and *Acris crepitans,* that were also calling. The *H. cinerea* were calling from the cattails and bay bushes, while the *H. flavigula* were calling from the water among the grass stems. Even from a full chorus of all of these forms no difficulty was experienced in distinguishing the call of *H. flavigula* with entire accuracy.

A. & M. COLLEGE, TEXAS

Subject Matter of Articles

Herpetologica recommends that articles be limited to one Class at least and preferably to one Order. Herpetologica would prefer to publish three papers by one author than one paper which included amphibians, crocodiles and geckos for instance. We have in mind ease of filing and concentration of subject matter for the specialist.

Diurnal or Crepuscular Habits Due to Temperature

Mr. Paul Swanson writes in Copeia, 1945: 210-216, that *Gonatodes fuscus* is often seen on tree trunks in the Canal Zone. In Jamaica the species appears to be strictly crepuscular. It is found in or under buildings.

Dr. E. R. Dunn writes, Mar. 11, 1946, that this species occurs from Mexico into northwest Columbia. He has seen it playing around the bases of large shade trees and mango trees in the daytime and once on the outside of a shed in the sunlight. He believes that it is hotter in Jamaica and that therefore the lizards keep to the shade. He says that it was hotter at Mariquita in the bottom of the Magdalena valley where *G. albogularis* (?) was definitely crepuscular. It was cooler at Villavicencio where *G. caudiscutatus* (?) plays around the bases of palms in the daytime.—C. Grant.

Champlain—Herpetologist

Samuel de Champlain de Bourage, after whom Lake Champlain was named, explored the West Indies in 1599-1601. The title of that part of his memoirs which interests us in the Champlain Society's translation is: Brief narrative of the most remarkable things that Samuel Champlain of Bourage observed in the West Indies during the voyage which he made to them.

His narrative states that Desirade was the first of the New World that he sighted. Next in order were Guadeloupe, the Virgin Islands, the coast of Venezuela and Puerto Rico which last had recently been pillaged by the English. Here he made his first herpetological observation on the giant *Anolis cuvieri* Merrem, of which he says: "There grows neither corn nor wine upon this island, whereon are a great quantity of chamelions which, it is said, live on air; but of this I can give no assurance although I have seen them many times. They have a rather pointed head, the body somewhat long for its thickness, that is to say, a foot and a half long, and they have only two legs, which are in front; the tail is very pointed, and of a color between gray and yellowish. The said chamelion is here represented." (The legend of the anolis living on air is met in various later writings. It is possible that he had heard of *Bipes* when he touched the mainland thus accounting for a two-legged illustration.)

From Puerto Rico he sailed to Santo Domingo, then Cuba and the "Caymanes" islands. These were undoubtedly some islands near the Isle of Pines and not the British Cayman Islands. Speaking of these islands he says: "I walked a league inland, through very thick woods, and caught some rabbits which were very numerous, a few birds and lizards as thick as my thigh, of a gray and dark yellow color." The rabbits he mentions were *Capromys* which his illustrator depicted as European rabbits. The large lizard was doubtless *Cyclura macleayi* Gray.

From Cuba he went to Mexico where he described *Crotalus* sp. thus: "Throughout all New Spain there is a kind of snake, as long as a pike, and as thick as one's arm; the head is as large as a hen's egg, and on it are two plumes and on the end of their tail they have a rattle. They are very dangerous with their teeth and with their tail. Nevertheless the Indians eat them after removing the two extremities." The artist's conception of the rattle is amusing as it is depicted as a child's rattle of spherical form. The "plumes" doubtless refer to the tongue. They are depicted as two beautiful ostrich plumes sprouting from the top of the head.—Chapman Grant.